IGNATOV, D.V.; LEBEDEV, Yu. N.

Opredelenie uprugosti para metallov pri vysokikh temperaturakh s pomoshchyyu vakuumnykh mikrovesov.

report submitted for the 5th Physical Chemical Conference on Steel Production.

MOSCOW 30 JUN 1959

SOV/180-59-3-14/43

AUTHORS: Ignatov, D.V. and Shamgunova, R.D., (Moscow)

TITLE: The Mechanism of Oxidation of Nickel-Chromium Based Alloys

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 3, pp 83-87 (USSR)

ABSTRACT: Alloys investigated were 80% Ni 20% Cr, Ni-Cr-Al alloys containing 20% Cr and up to 10% Al; and Ni-Cr-Ti alloys with 20% Cr and up to 10% Ti. Figure 1 shows the oxidation rates for various alloys at different temperatures. Electrongrams were taken of the surface films. Table 1 shows the structures of the films and Fig 3 gives typical electrongrams. Results show that the rate of oxidation of the nichrome alloy is lower than that for chromium at 800 to 1000°C. This is because there forms on the surface a film containing the compound $NiCr_2O_4$ which is very stable. The oxidation rate of nichrome is also reduced by aluminium additions, especially at temperatures higher than 700°C. In order to obtain successful protection, 4-5% Al at 900°C and 7% at 1000°C is required. An addition of 0.68% Ti also decreases the oxidation rate but 3.4% and more increases the oxidation rate because Ni_3Ti is formed and also

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The Mechanism of Oxidation of Nickel-Chromium Based Alloys

because there is a greater content of titanium oxide in the film. Titanium also results in intergranular corrosion of the alloy (see Fig 2 showing micrographs of nichrome with (a) 5.9% Ti added and (b) 7.270 Al added, after oxidation at 1000°C). There are 3 figures, 2 tables and 4 references, 1 of which is English and 3 Soviet.

SUBMITTED: January 9, 1959

IGNATOV, D.V.; SHAMGUNOVA, R.D.

Structural and kinetic study of the oxidation process of nickel, chromium, and their alloys. Issl.po zharopr.splav. 4:346-351 '59. (MIRA 13:5)
(Nickel--Corrosion) (Chromium--Corrosion)

PHASE I BOOK EXPLOITATION SOV/3828

Ignatov, Daniil Vasil'yevich, and Roza Davletovna Shamgunova

O mekhanizme okisleniya splavov na osnove nikelya i khroma (Oxidation Mechanism of Nickel-Chromium Alloys) . Moscow, Izd-vo AN SSSR, 1960. 105 p. Errata slip inserted. 2,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii.

Resp. Ed.: N.V. Ageyev, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: B.V. Mints; Tech. Ed.: L.A. Sushkova.

PURPOSE: This book is intended for metallurgists, particularly those concerned with the oxidation of nickel-chromium alloys.

COVERAGE: The basic methods used in investigating oxidation processes in metals and nickel-chromium alloys in gaseous media at elevated and high temperatures (400-1050°C) are discussed. The principal results of experimental studies on the kinetics of oxidation, the structure and composition of oxide films which

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form on Ni-Cr alloys and their separate components depending on time and heating temperature are described. The effect of various alloying elements on the heat resistance of these alloys is also discussed. Recent theories on the oxidation of metals and alloys are presented and the possibility of using them to explain the mechanism of oxidation in Ni-Cr alloys is examined. No personalities are mentioned. There are 117 references: 52 Soviet, 39 English, 12 German, 6 French, and 8 others.

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AVAILABLE: Library of Congress

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7-15-60

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IGNATOV, D.V.

PHASE I BOOK EXPLOITATION SOV/4535
SOV/16-8-5

Akademiya nauk SSSR. Institut metallurgii

Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody issledovaniya (Physicochemical Research Methods in Metallurgy and Metal Science) Moscow, Izd-vo AN SSSR, 1960. 251 p. (Series: Its: Trudy, vyp. 5) Errata slip inserted. 2,800 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova.

Resp. Ed.: I.P. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Klimov; Tech. Ed.: T.P. Polenova.

PURPOSE: This collection of articles is intended for metallurgists and metal researchers.

COVERAGE: The collection contains articles on metallurgy, metal science, and physicochemical research methods. Separate articles discuss the structure and properties of some metals and alloys. The effect of cold treatment and inclusions on the properties of alloys are analyzed, and instruments and

Card 6/7

86751

S/120/60/000/006/027/045
E032/E314

5.5800 (1043, 1273, 1229)

AUTHORS: Ignatov, D.V. and Lebedev, Yu.N.

TITLE: Universal Apparatus for the Determination of the Rate of Evaporation and Decomposition of Various Substances in a Vacuum

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No. 6, pp. 107 - 110

TEXT: A description is given of a universal apparatus (in a glass envelope) which can be used to determine the rate of evaporation and the heat of evaporation of metals and components of alloys in the temperature range 20 - 2 000 °C. It can also be used to study the kinetics of decomposition of chemical compounds, and to determine their chemical and phase composition by sublimation and condensation at target in a high vacuum and subsequent analysis of the products by electron diffraction and other methods. The principal parts of the apparatus are a torsion microbalance and an evaporator placed in the same vacuum chamber. The frame and the balance beam were made from fused quartz rods 4 and 2 mm in diameter and the restoring and suspension wires were made of tungsten

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86751

S/120/60/000/006/027/045
E032/E314

Universal Apparatus for the Determination of the Rate of Evaporation and Decomposition of Various Substances in a Vacuum

(13 μ in diameter). A detailed description of these balances is given by Rodin et al in Refs. 1 and 2. They are of conventional design. The balance is calibrated by suspending sections of a silver wire of known weight. The evaporator was in the form of the usual Knudsen furnace in the form of a tantalum container whose temperature was measured by a platinum-platinum/rhodium thermocouple. The furnace was operated under effusive conditions with an output aperture of 0.3 - 0.5 mm in diameter and a wall thickness of 0.05 mm. The furnace is heated by tungsten spirals. The working temperature could be achieved in about 30 sec after switching on the current and the working vacuum was between 10^{-6} and 5×10^{-7} mm Hg when the temperature was 1 200 - 1 400 °C. The collimator had an aperture of 15 mm in diameter and was located at 20 mm

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S/120/60/000/006/027/045
E032/E314

Universal Apparatus for the Determination of the Rate of Evaporation and Decomposition of Various Substances in a Vacuum

from the face of the furnace and at a distance of 5 mm from the target. The collimating diaphragm was attached to a massive copper block in order to maintain it at a sufficiently low temperature. The block was water-cooled. Chemically-active residual gases were removed by passing chemically-pure argon through the apparatus. The beam produced by the Knudsen furnace and collimated by the diaphragm was condensed on a target suspended from the torsion balance. The composition of the condensate was determined by an electron-diffraction method with the aid of radioactive isotopes and by chemical analysis. In the case of the electron-diffraction analysis the condensate was removed from the target either by immersion in water or by dissolving the target. A counter for recording radioactive emissions was also included and could be used to determine the rate of evaporation. The apparatus has been used to determine the rate of evaporation of a number of

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E032/E314

Universal Apparatus for the Determination of the Rate of Evaporation and Decomposition of Various Substances in a Vacuum

metals and alloys. The following table gives the data on the vapour pressures and heat of evaporation of erbium, chromium a... solid solutions of titanium and chromium:

Temperature of Evaporation, °C	Vapour pressure P, 10^{-4} mm Hg			
	Er	Cr	Cr+0.6 at.% Ti	Cr+1.0 at.% Ti
1100	2.10			
1150	2.58	1.41	0.41	0.30
1200	8.69	4.57	2.53	1.61
1250	12.04	13.49	6.39	5.65
1300	43.10	37.15	25.75	13.52
	Temperature of evaporation, kjoules/mol			
Card 4/6	267.7	404.9	477.8	499.9

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The temperature dependence of the vapour pressure (mm Hg) was found to be given by the following expressions:

$\lg p = 11.0 - 21170/T$; for Cr;

$\lg p = 13.28 - 2500/T$; for Cr + 0.6 at.% Ti;

$\lg p = 13.25 - 25200/T$; for Cr + 1.0 at.% Ti;

$\lg p = 6.40 - 14000/T$; for Er.

There are 4 figures, 1 table and 5 Soviet references

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Universal Apparatus for the Determination of the Rate of Evaporation and Decomposition of Various Substances in a Vacuum

ASSOCIATION: Institut metallurgii AN SSSR
(Institute of Metallurgy of the AS USSR)

SUBMITTED: October 27, 1959

Card 6/6

36828
S/137/62/000/004/141/201
A060/A101

5.4300

AUTHORS: Ignatov, D. V., Lebedev, Yu. N.

TITLE: Universal installation for the determination of evaporation rates and the decomposition of various substances in vacuum

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 93, abstract 4I560 (V sb. "Fiz.-khim. osnovy proiz-va stali". Moscow, AN SSSR, 1961, 305 - 310)

TEXT: The description is given of an installation for determining the rates and heats of vaporization of metals and alloy components, and which also enables the investigation of the decomposition kinetics of chemical compounds and the determination of their chemical and phase compositions. This is done by sublimation and condensation on a target in the interval between 20 and 2,000°C at high vacuum with subsequent analysis of the condensation products by electronographic or other methods, by means of radioactive isotopes or chemical analysis. The material under investigation is placed in an evaporator consisting of a Knudsen cell and a heater. The Knudsen cell is made of a massive tantalum beaker,

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Universal installation for...

and the heater is made in the form of a turgsten cylindrical spiral whose end is fixed by a spring: this makes it possible to avoid the deformation of the spiral under heating up to operating temperatures of 1,400 - 1,700°C. This way of attaching the spiral makes it possible to eliminate the ordinarily used ceramic holders. The stream of vapor from the vaporizing substance is shaped by the opening in the Knudsen cell and the collimating diaphragm, and directed onto the target suspended from one of the ends of the balance arm of a torsion microbalance and condenses upon it. By introducing an active measurement sensor into the installation it is possible to determine simultaneously the vaporization rate of several components of an alloy. The results are cited of a number of investigations on the determination of vaporization rates of metals and alloys (Er, Cr, solid solutions of Cr and Ti). There are 5 references.

Ye. Assonova

[Abstracter's note: Complete translation]

Card 2/2

S/180/61/000/006/011/020
E071/E335

AUTHORS: Ignatov, D.V. and Kovalev, Ye.A. (Moscow)

TITLE: On the mechanism of the influence of vanadium pentoxide on the velocity of oxidation of steel ЭИ-417 (EI-417)

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 6, 1961, 107 - 114 + 1 plate

TEXT: Combustion in a gas turbine of a high-sulphur oil, also containing increased quantities of vanadium and sodium, causes a rapid corrosion of the turbine blades. There is no agreement in the literature as to the mechanism of this type of corrosion and for this reason the authors investigated the process of oxidation of steel specimens heated to temperatures of 600 - 850 °C in air, in contact with and without vanadium pentoxide and a mixture of vanadium pentoxide and sodium sulphate. A chromium nickel austenitic steel EI-417 (0.11% C, 1.24% Mn, 0.76% Si, 24.1% Cr, 18.47% Ni, 0.022% P and 0.013% S), after hot-rolling without thermal treatment, was used for the investigation. Specimens were prepared in the form of plates 20 x 10 x 17 mm. A synthetic

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On the mechanism of ....

ash(composition, %: V_2O_5 - 41.6, Na_2SO_4 - 11.2, Al_2O_3 - 16.0, Fe_2O_3 - 16.0, SiO_2 - 7.2, NiO - 6.4 and CuO - 1.6, corresponding to the ash of a fuel oil) and vanadium pentoxide in the form of paste were used for coating the specimens. Experiments on the kinetics of oxidation of the steel were carried out in air at temperature of 600, 650, 700, 750, 800 and 850 °C. For comparison, oxidation of specimens of the same composition and at the same temperatures but without contact with the ash or vanadium pentoxide, was carried out for 1, 2, 4, 8, 16, 32, 64 and 100 hrs. The coating was renewed every 20 hours in the oxidation tests of the coated specimens. Removal of corrosion products from the specimens was done electrochemically. It was found that, on heating in air, steel EI-417 oxidises according to the parabolic law (with the exception of the first stage during the first four hours) and, on heating in contact with V_2O_5 or with the above mixture - according to the linear law in the whole temperature range investigated (650 - 850 °C). The corresponding velocity constants were calculated as: 0.085, 21.2 and 41.5 g/m^{2}hr. On contact of

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On the mechanism of ....

the specimens with corrosive mixtures the velocity of corrosion sharply increases with increasing temperature. A particularly sharp increase in the corrosion velocity was observed above 650 °C for the mixture and above 700 °C for vanadium pentoxide. Thus, a rapid oxidation was observed only in the presence of liquid V_2O_5 phase and low melting iron vanadates and their mixtures with iron and chromium oxides. The oxide film of specimens oxidised in air was analysed by electron-diffraction methods and the corrosion products of specimens oxidised in contact with V_2O_5 and the mixture were submitted to X-ray and electron-diffraction analyses. The results obtained indicate that the film formed on oxidation of specimens in air (not in contact with V_2O_5 ... solutions of the spinels ...

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α-Al_2O_3 type, the presence of other compounds, e.g. V_2O_5, Na_2SO_4 was confirmed. A more accurate determination of the composition was not possible due to the low intensity of the lines and a large number of phases present. On the basis of the results obtained the following mechanism of the influence of V_2O_5 and V_2O_5 + Na_2SO_4 on the velocity of oxidation of EI-417 steel is postulated: liquid V_2O_5 in contact with the surface of specimens rapidly destroys a thin layer (100 - 200 Å) consisting mainly of Fe_2O_3, formed during the preparation of specimens and their initial heating to the melting temperature of V_2O_5. Therefore, during the initial period of oxidation, instead of a protective oxide layer in the solid state, a liquid layer consisting of a mixture of V_2O_5 and α-Fe_2O_3 is formed. Air oxygen penetrates this layer easily to the boundary metal-oxide layer and oxidises the components of steel, predominantly iron and chromium. If no fresh V_2O_5 is added, the protective

On the mechanism of ....

properties of the oxide film can be regenerated due to the reduction of V_2O_5 with chromium to high-melting V_2O_3. In the presence of liquid V_2O_5 the scale formed is porous and consists mainly of a mixture of oxides α-Cr_2O_3, α-Fe_2O_3, V_2O_5 and possibly of small quantities of vanadates, $FeVO_4$, $CrVO_4$ and compounds of the type $2NiO.V_2O_5$. Shearing stresses are generated in the scale causing its peeling off from the metal on cooling, due to a large molecular volume of V_2O_5. Oxide compounds of the spinel type are absent in this case, because in the presence of V_2O_5 free NiO and FeO are not formed. The mechanism of the influence of the mixture (V_2O_5 + Na_2SO_4) on the velocity of oxidation of the steel is basically the same as of V_2O_5, except that, due to the presence of sodium sulphate, the activity of the mixture is increased. The latter is due to a

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decrease in the melting temperature (to 650 °C) and the appearance of sulphuric anhydride ($V_2O_5 + Na_2SO_4 = 2NaVO_3 + SO_3$).

There are 3 figures, 4 tables and 16 references: 1 Soviet-bloc (translated from non-Soviet publication) and 15 non-Soviet-bloc. The four latest English-language references mentioned are: Ref. 1: W. Foster, M. Leipole, T.A. Shevlin - Corrosion, 12, no.11, 1956, 23; Ref. 7: E. Fitzer, I. Schwab - Corrosion, 12, no. 9, 1956, 49; Ref. 10: G. Lucas, M. Weddell, A. Precce - J. Iron and Steel Inst., 1955, 179, 342; Ref. 15: H. Logan - Corrosion, 15, no. 8, 1959, 61.

SUBMITTED: February 10, 1961

Card 6/6

VOTINOVA, V.V.; IGNATOV, D.V.

Investigating diffusion processes of iron and chromium in single crystals of corundum and ruby. Trudy Inst. met. no.8:263-268 '61. (MIRA 14:10)

(Metal crystals)
(Diffusion coatings)

IGNATOV, D.V.; CHURAYEV, P.V.

Increasing the heat-resistance of EI-867 alloys by means of aluminum coatings. Issl. po zharopr. splav. 9:187-189 '62. (MIRA 16:6)

(Nickel-chromium alloys) (Aluminum coating)

S/776/62/000/025/022/025

AUTHORS: Yudkevich, M.I., Ignatov, D.V.

TITLE: Investigation of the oxidizability of Iron-Nickel alloys with additions of Cobalt, Chromium, and Copper for bonding with glass.

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 25. Moscow, 1962. Pretsizionnyye splavy. pp. 303-310.

TEXT: The paper describes an experimental investigation based on the assumption that a good bond between the alloys cited in the title and glass is contingent on a strong wetting of the metal surface by the fused glass and is further founded on the hypothesis that such wetting is favored by metal surfaces covered with a layer of oxide. It is also postulated that a strong vacuum-resistant film layer must have a specified thickness, since an exceedingly thin film cannot ensure an adequately strong bond, whereas as an excessively thick film may be subject to spalling. Two alloys were tested in particular, namely, the H47XБ (N47KhB) and H47 Д5 (N47D5), the compositions of which are tabulated in comparison with the industrially widely used alloy H29X18 (N29Kh18) which affords a satisfactory bond with glass. The microstructure of the alloys is a phase with a face-centered

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cubic lattice. The tests were made at a T of 600-1,000°C and after holding times of 200-300 min. The mean oxidation rate is highest in the N29K18 alloy, less in the N47D5 alloy, and least in the N47KhB alloy. The rate of oxidation at a given T decreases with holding time according to an appx. parabolic law. The densest oxide film appears on the N47KhB alloy, then on the N47D5, and lastly on the N29K18 alloy. Electron-diffusion analysis indicated that the composition of the oxide film on the Fe-Ni-Cr alloy N47KhB corresponds to a solid solution with Fe_2O_3 and α Cr_2O_3 at 600-700°C; at 800-1,000° the probable composition along the alloy-scale boundary is the oxide αCr_2O_3, whereas in the outer oxidized film it may comprise the solid solution $NiFe_2O_4$ plus $NiCrO_4$ and $FeCrO_4$. Further details of the composition of the oxide film are provided. The elevated oxidizability of the Fe-Ni-Co alloy N29K18 is explained by the smaller protective effectiveness of the oxide film containing a solid solution of $NiFe_2O_4$ and $CrFe_2O_4$ which is the result of the great stresses that appear in the lattice of that solid solution because of the presence of large-size ions such as Ni^{2+} and Co^{2+}. The results of the present investigation are consistent with those of the Japanese author K. Ono (J. Appl. Phys. Japan, v. 25, no. 12, 1956, 500). There are 6 figures, 1 table, and 5 references (4 Russian-language Soviet, K. Ono's English-language paper).

NAUMKIN, O.P. (Moskva); IGNATOV, D.V. (Moskva)

Electronography of the oxidation of thin scandium films. Izv. AN SSSR. Met. i gor. delo no.5:141-144 S-O '63. (MIRA 16:11)

ACCESSION NR: AT4007057 S/2598/63/000/010/0339/0344

AUTHOR: Ignatov, D. V.

TITLE: Titanium oxidation mechanism and protection against gas corrosion

SOURCE: AN SSSR. Institut metallurgii. Titan i yego splavy*, no. 10, 1963. Issledovaniya titanovy*kh splavov, 339-344

TOPIC TAGS: titanium oxidation, titanium gas corrosion, anticorrosive coating, anticorrosive alloying, coating effect, composition effect, titanium corrosion prevention, corrosion prevention, protective coating

ABSTRACT: The results of many investigations of titanium oxidation in oxygen and air in the temperature range 300 -1200 C, despite contradictions, can be summarized as follows: (1) The process of titanium oxidation proceeds in two ways: by formation of an oxyde skin at the surface and by dissolution of oxygen in titanium. (2) The oxidation process follows a logarithmic law up to 300 C, a third-power exponential law in the interval 300-600 C, a parabolic law in the interval 600-850 C, and a linear law above 850 C; however, the change from one law to the other is also time-dependent. (3) In the whole

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ACCESSION NR: AT4007057

temperature range 500-1000 C, the oxide scale on the titanium surface contains mainly rutile (TiO_2); in some cases TiO occurs in the interstice between metal and scale. At temperatures higher than 1100 C, V. I. Arkharov and G. P. Luchkin have established three phases in the scale: TiO (interstice metal/scale), Ti_2O_3 (adjacent to outer boundary of TiO), and TiO_2 (on the boundary scale/gas). The predominant opinion is that the titanium oxidation process below 900 C results from diffusion of oxygen into titanium, and the reaction of oxidation takes place at the boundary metal/scale; above 900 C, the process proceeds mainly as a result of titanium and oxygen diffusion, and with the increase of temperature to 1200 C the role of titanium diffusion in the growth of scale increases. The investigations carried out by I. I. Kornilov and associates of the mechanism of oxidation are mentioned by the author; these show that additions of aluminum, beryllium, and silicon increase the heat resistance of titanium. Further it is mentioned that I. A. Popov and V. I. Rabezova developed an alloy on the basis of γ - TiAl with addition of Cb, which exhibits a corrosion resistance at 800-1000 C approximately equal to that of alloy 80% Ni+20% Cr. Furthermore, investigations of P. M. Arzhanyi are mentioned, wherein the efficiency of beryllium and aluminum anticorrosive coatings has been demonstrated. It

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has been the purpose of the present investigations to obtain structure-kinetic data on the oxidation mechanism of titanium and some of its alloys to answer the following questions: (1) Why is the rapidity of oxidation of titanium and most of its alloys over a wide range of temperatures about ten times higher than that of nickel, chromium, and their alloys? (2) How can the heat resistance of titanium alloys be raised to the level of heat resistance of nickel-chromium alloys? Under the guidance of the author tests have been conducted by Yu. M. Levedev, R. D. Shangunova, and V. V. Votinova (laboratoriya kristallokhimii) (of the Crystal Chemistry Laboratory) in cooperation with the Metal Chemistry Laboratory of the Institut Metallurgii im. A. A. Baykova (metallurgical Institute). The test specimens have been weighed during tests of a scale with a sensitivity of $6x10^{-5}$ gr. Oxidation kinetics in pure dry oxygen at 100mm Hg pressure has been investigated on a torsional microbalance with a sensitivity of 10^{-7} to 10^{-6} gr. The phase content of the scale has been determined mainly by electron micrographs and partially by the X-ray diffraction method. Part of the specimens was coated with aluminum or nickel-aluminum. The phenomenon of accelerated titanium oxidation in the temperature range 850-1000 C has been explained by loosening of the crystal lattice in the region of alpha-beta transformation and by consequent increase of oxygen solubility in titanium. Furthermore, it has been explained that components such as aluminum increase the titanium lattice regidity, thus opposing the diffusion of

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oxygen into titanium, particularly when intermetallics form in the solid solution. The following recommendations have been made to increase the resistance of titanium and its alloys against gas corrosion: (1) application of nickel-aluminum coatings in application at 700-900°C: (2) inclusion of alloying elements which strengthen the alpha-Ti and beta-Ti, and form intermetallics of the type TiAl, $CbAl_3$, $MoAl_3$. Orig. art. has: 2 figures

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute AN SSSR)

SUBMITTED: 00 DATE ACQ: 27Dec63 ENCL: 00

SUB CODE: MM, GC NO REF SOV: 009 OTHER: 007

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L 54496-65
ACCESSION NR: AP5013123

3

scale. Alloys containing larger amounts of Si (approximately 1.2% as compared with
[illegible] oxidized at a markedly lower rate, the alloys with .1 La showing even better
[illegible] formed with in-

scale. Alloys containing larger amounts of Si (approximately 1.2% as compared with .3%) oxidized at a markedly lower rate, the alloys with .1 La showing even better oxidation resistance. Oxides with higher free energy of formation formed with increasing depth. The presence of SiO_2 and Cr_2O_3 in inner layers is attributed to both secondary and internal oxidation. The total oxide layer is divided into two basic parts: an upper layer which is formed by diffusion of metal ions to the surface and a lower layer which is attributed to oxygen diffusing into the oxide-metal interface. Lanthanum addition slows diffusion of Ni and Cr ions, raises the activity of Si, and hinders the inward diffusion of oxygen. Orig. art. has: 4 figures, 4 tables.

ASSOCIATION: none

SUBMITTED: 14Feb64 ENCL: 00 SUB CODE: MM

NO REF SOV: 001 OTHER: 004

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L 28538-66 EWT(m)/EWP(t)/ETI IJP(c) JD/WB/GL

ACC NR: AT6012383 SOURCE CODE: UR/0000/65/000/000/0143/0147

32
31
B+1

AUTHORS: Kornilova, Z. I.; Ignatov, D. V.

ORG: none

TITLE: A structural-kinetic study of the oxidizability of titanium alloys

14 27

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 143-147

TOPIC TAGS: titanium alloy, metal oxidation, oxidation kinetics, phase composition, temperature, phase transition / AT12 titanium alloy

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ABSTRACT: The results are given of a study of the kinetics of oxidation of titanium alloys of the AT type and of the phase composition of the scale formed on them. The kinetic curves of oxidation were obtained by the method of intermittent weighing on a balance with a sensitivity of $2 \cdot 10^{-5}$ g. Specimens in the form of 10 x 10 x 4-mm wafers were cut from forged and annealed (at 950C) rectangular rods. With prolonged exposure, the oxidation kinetics of AT alloys are functions of temperature and time (see Fig. 1). In the scale formed at 800—1000C, rutile and γ-Al_2O_3 were detected.

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ACC NR: AT6012383

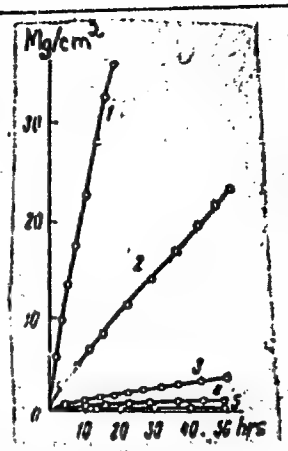

Fig. 1. Kinetic curves of oxidizability in air of AT12 alloy: 1 - 1000C; 2 - 9000; 3 - 8000; 4 - 7000, 5 - 6000.

A metallographic study of the scale on pure titanium and its alloys showed that the thickness of the oxygen-saturated layer on pure titanium is considerably greater than that on the alloys. The aluminum in the alloys stabilizes the phase α-Ti and increases the point of $\alpha \rightarrow \beta$ transition by 50—100C, depending upon the concentration. The intensive oxidation of the titanium alloys at 800—1000C is explained by: 1) the presence of an allotropic $\alpha \rightleftarrows \beta$ transition; 2) intensive reaction of the scale with the metal; 3) the high ratio of the volume of TiO_2 to the volume

plained by: 1) the presence of an allotropic $\alpha \rightleftarrows \beta$ transition; 2) [illegible] tion of the scale with the metal; 3) the high ratio of the volume of TiO_2 to the volume of the metal; and 4) the absence in the scale of chemical compounds of TiO_2 and oxides of the alloy components that are thermodynamically stable at 800—1100C.

Orig. art. has: 5 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 004

Card 2/2 AC

ACC NR: AT6034468 (N) SOURCE CODE: UR/0000/66/000/000/0290/0292

ACC NR: AT6034468

The films were washed of traces of salts by transferring them into another cup of pure water. The tungsten films produced in this manner were heated in the temperature interval of 800 to 1800° in a vacuum of 10^{-4}-10^{-6} torr, by passing an electric current. The phase composition of the films was determined by the electronographic method. Analysis of the electronograms showed that: 1) tungsten films heated in a vacuum of 10^{-4} torr without the use of traps cooled by liquid nitrogen, at temperatures of 900-1000°, are transformed within 1 hour into the carbides W_2C and WC; at 800°, W_2C is observed in the amount of approximately 30%; 2) even for films heated in a vacuum of 3×10^{-6} torr, with the use of two traps cooled by liquid nitrogen, in the temperature interval from 1000-1700°, there is always present a mixture of W_2C and WC. Orig. art. has: 2 figures.

SUB CODE: 11/ 09/ SUBM DATE: 10Jun66/ ORIG REF: 001/ OTH REF: 001

Card 2/2

L 24798-66 EWT(m)/T/EWP(t) IJP(c) JD/JG
ACC NR: AP6011661 SOURCE CODE: UR/0020/66/167/003/0635/0636

AUTHOR: Ageyev, N. V. (Corresponding member); Ignatov, D. V.; Kantor, M. M.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Electron microscopic and microdiffraction analysis of nonmetallic inclusions in molybdenum and its alloys

SOURCE: AN SSSR. Doklady, v. 167, no. 3, 1966, 635-636, and insert facing p. 636

TOPIC TAGS: molybdenum, molybdenum alloy, alloy inclusion, nonmetallic inclusion, electron beam melted alloy

ABSTRACT: The electron microscope is used for studying nonmetallic inclusions in molybdenum and its alloys melted by various methods. The phase composition and distribution of the inclusions were determined in specimens of molybdenum produced by electron-beam melting and in molybdenum alloys containing carbon (0.003-0.021%), titanium (0.02-0.3%) and zirconium (0.01-0.15%), produced by arc melting, and also by fusion melting. The specimens were studied in the cast, deformed and annealed states. The method used for producing the replicas is briefly described. Photomicrographs and diffraction patterns show that the inclusions consist basically

Card 1/2 UDC: 537.533.35:548.4:669.28

L 24798-66

ACC NR: AP6011661

of Mo_2C molybdenum carbide. This is probably due to the melting conditions and heat treatment of the specimens. The electron-beam melting and annealing were done in a vacuum of 10^{-4}-10^{-5} Hg mm. Oil vapor diffusion pumps were used for producing the vacuum. Apparently the main residual gas consists of the oil vapors which decomposes to form carbon. This carbon diffuses into the metal and forms carbides. The residual gas in this case does not oxidize molybdenum and tungsten as is the case for several other metals (e.g. Al, Ti, Zr, Fe etc.). Molybdenum and tungsten oxides are apparently unstable under these conditions while their carbides are highly stable. Orig. art. has: 3 figures, 1 table. [14]

SUB CODE: 11/ SUBM DATE: 28Aug65/ ORIG REF: 004/ OTH REF: 004/ ATD PRESS: 4260

Card 2/2

IGNATOV, D.V., starshiy nauchnyy sotrudnik; PETRENKO, A.G., nauchnyy sotrudnik

Morphological changes in the lymphatic nodes under the influence of a constant source of ionizing radiation (P-32) on the organism; a preliminary report. Trudy Ukr. nauch.-issl. inst. ortop. i travm. no.15:355-358 '59 (MIRA 16:12)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta ortopedii i travmatologii imeni prof. M.I.Sitenko (dir.- chlen korrespondent AMN SSSR, prof. N.P.Novachenko).

IGNATOV, D.V.; BELAN, M.G.

Fibromyxoma of the humerus. Arkh. pat. 23 no.3:69-71 '61. (MIRA 14:3)

(HUMERUS—TUMORS)

IGNATOV, D.V., starshiy nauchnyy sotrudnik

Systemic innervation of bone tissue and of the bone marrow in man. Ortop., travm. i protez. 17 no.3:11-18 My-Je '56. (MLRA 9:12)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta ortopedii i travmatologii im. M.I.Sitenko (dir. - zasluzhennyy deyatel' nauki prof. M.P.Novachenko)

(BONE MARROW, innervation, (Rus))
(BONES, innervation, (Rus))

IGNATOV, F.P.

Further development of Ukrainian heavy industry during the fifth five-year plan. Izv. KPI 25:19-33 '57. (MIRA 11:3)
(Ukraine--Industries)

MUCHNIK, V.S., prof., doktor tekhn.nauk, obshchiy red.; IGNATOV, F.I., inzh., obshchiy red.; NUROK, G.A., doktor tekhn.nauk, otv.red.; OKHRIMENKO, V.A., red.izd-va; ALADOVA, Ye.I., tekhn.red.; LOMILINA, L.N., tekhn.red.

[Transactions of the First All-Union Scientific and Technological Conference on Hydraulic Coal Mining; collection of reports] Trudy Vsesoiuznoi nauchno-tekhnicheskoi konferentsii po gidravlicheskoi dobyche uglia; sbornik dokladov. Moskva, Ugletekhizdat, 1959. 799 p. (MIRA 12:9)

1. Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po gidravlicheskoy dobyche uglya. 1st, Stalinsk, 1957. 2. Vsesoyuznyy nauchno-issledovatel'skiy i proyektno-konstruktorskiy institut dobychi uglya gidravlicheskim sposobom (for Ignatov). 3. Moskovskiy gornyy institut (for Nurok).

(Hydraulic mining--Congresses)
(Coal mines and mining)

IGNATOV, G.T.

SAVCHENKO, I.M.; SYROMYATNIKOV, S.S.; IGNATOV, G.T.

Assembly line used in manufacturing hollow reinforced concrete panels with common reinforcement. Rats. i izobr. predl. v stroi. no.3:5-8 '57. (MIRA 11:1)

(Concrete slabs)

IGNATOV, I.

" They will fulfill their promises with honor."

p. 29 (Leka Promishlenost, Vol. 6, no. 5, 1957, Sofiia, Bulgaria.)

" The work of the Chemistry-Technical Institute."

p. 29 (Leka Promishlenost, Vol. 6, no. 5, 1957, Sofiia, Bulgaria.)

Monthly Index of East European Accessions (EEAI) LC, Vol. 7, No. 6, June 1958.

IGNATOV, I.

(13)

Sofia, Veterinarna Sbirka, Vol 58, No 8, 1961

1. "Immunologic Diagnosis of Brucellosis," K. K. [illegible] (Academician) and R. V. [illegible] (Candidate of Veterinary Sciences); pp 6-10.

2. "A Case of Enzootic Gangrenous Mastitis in Sheep, Caused by Mixed Infection with Micrococcus mastitidis [illegible] ovis and Bacterium mastitidis (Cameron and Fraser)," Bogdan [illegible] (VNIIV*, Sofia), p 11.

3. "Ensilaging of Forage as a Weapon against Some Helminths," Georgi [illegible] (Assistant at the Zootechnical Faculty†); pp 12-13

4. "Intermediate Host of Thelazia rhodesi in Bulgaria," Ivan [illegible]; pp 13-14

5. "A Case of Mass Infertility in Sheep," Pavel [illegible] (NVS* in Burgas); pp 15-18.

6. "Influence of SZhK (Preparation of Serum Obtained from Pregnant Mares) upon Reproductive Ability in Ewes," Stoyan [illegible] and Dimitr [illegible] (NVS* in [illegible]); pp 18-21.

7. "A Case of Peptic Ulcer in a Calf," [illegible], Chief Veterinary Physician, and Konstantin [illegible], Veterinary Physician; pp [illegible].

8. "Necrobacillosis in the Rumen of a Buffalo Cow," I. [illegible] and I. [illegible]; pp 23-25

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*Abbreviation not identified.
† Zootekhnicheskiya fakultet.

— 1/1 —

IGNATOV, Ig.

BULGARIA / Farm Animals. General Problems. Q-1

Abs Jour: Ref Zhur-Biol., No 23, 1958, 105617.

Author : Platikanov, N., Ivanov, P., Ignatov, Ig.
Inst : Institute of Animal Husbandry, Bulgarian AS.
Title : Development of Animal Husbandry (in Bulgaria) and Measures for Its Further Advancement.

Orig Pub: Izv. In-ta zhivotnovŭdstvo, Bŭlg. AN, 1957, kn. 8, 10-36.

Abstract: No abstract.

Card 1/1

IGNATOV, Iv

6430/14

Author: Iv. Ignatov

Title: "Successful Tests with Bacterial Fertilizers

Source: Sofia, Zemedelsko Zname, 9 May 61, p. 2

Description: Brief article calls for the use of bacterial fertilizers, mentions experiments carried out in 1960 and cites improved yields in percent for individual crops, mentions plans for expanded tests in 1961, and gives cost per decare. /in toto/

IGNATOV, Ivan

Higher standard of living of the workers in Bulgaria. Trud tseni 4 no.8:1-9 '62.

IGNATOV, I.

Ignatov, I. Analysis of the curve in rebroadcasting devices. p. 23. RADIO. Sofiya. Vol. 4, no. 1, 1955.

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 11, Nov. 1955, Uncl.

IGNATOV, I.

The International Radiobroadcasting Organization is in the fore for peace. p. 9. RADIO. (Ministerstvo na poshtite, telegrafite, telefonite i radioto i Tsentralniia suvet na dobrovolnata organizatsiia za sudeistvie na otbranata) Sofiya. Vol. 4, no. 5, 1955

SOURCE: East European Accessions List, (EEAL), Library of Congress Vol. 4, NO. 12, December 1955.

IGNATOV, IV.

Power Transformers (Shell Transformers). Radio Engineering, #6:19:June 55

IG-NATOV

~~IGANTOV~~, IV.

The OIR (International Radio Broadcasting Organization) on the Front for Peace. Radio Engineering, #5:9:May55

IGNATOV, Iv., inzh.

A variant of the system of remote control with frequency and impulse coding. Mashinostroene 10 no.12:26-27 '61.

L 16364-65 EWT(1)/EEC(a)/EWP(m)/FS(v)-3/EEC(j)/EEC(r)/EWG(v)/EWA(d)
Po-4/Pe-5/Pq-4/Pg-4 IJP(c)/ESD(dp)/ESD(gs)/BSD/ASD(a)-5/AFMDC/AFMD(t)/
AFETR/AFTC(a) GW

ACCESSION NR: AP5000111 S/0198/64/010/006/0654/0659

AUTHOR: Ignatov, I. V. (Kiev)

TITLE: Determination of the statistical characteristics of the orbital parameters for an artificial earth satellite in unperturbed motion

SOURCE: Prykladna mekhanika, v. 10, no. 6, 1964, 654-659

TOPIC TAGS: earth satellite orbit

ABSTRACT: The statistical characteristics of the orbital parameters for an artificial earth satellite are determined. They are the consequence of the random spread of the parameters at the end of the active portion of the trajectory:

$$\langle \Phi_k \rangle = \langle \Phi_k(q_1, q_2, \ldots, q_n) \rangle = |\Phi_k(q_1, q_2, \ldots, q_n)|_0,$$

$$\langle \Phi_k \rangle = |\Phi_k(q_1, q_2, \ldots, q_n)|_0 + \frac{1}{2} \sum_{i,j} \left(\frac{\partial^2 \Phi_k}{\partial q_i \partial q_j} \right)_0 \langle \delta q_i \delta q_j \rangle,$$

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ACCESSION NR: AP5000111

$$D(\Phi_k) = \sum_i \left(\frac{\partial \Phi_k}{\partial q_i}\right)_0^2 \sigma_{q_i}^2 + 2\sum_{i,j} \left(\frac{\partial \Phi_k}{\partial q_i}\frac{\partial \Phi_k}{\partial q_j}\right)_0 \langle \delta q_i \delta q_j \rangle$$

where

$$\sigma_{q_i}^2 = \langle \delta_{q_i}^2 \rangle,$$

$$\langle \Omega \rangle = \operatorname{arctg}\left(-\frac{c_1}{c_2}\right)_0;$$

$$D(\Omega) = \left(\frac{c_2}{c_1^2+c_2^2}\right)_0^2 \sigma_{\delta c_1}^2 + \left(\frac{c_1}{c_1^2+c_2^2}\right)_0^2 \sigma_{\delta c_2}^2 - \frac{2c_1c_2}{(c_1^2+c_2^2)^2}\langle \delta c_1 \delta c_2 \rangle$$

where

$$\delta c_1 = \dot{z}_0 \delta y_0 - \dot{y}_0 \delta z_0 - z_0 \delta \dot{y}_0 + y_0 \delta \dot{z}_0;$$

$$\delta c_2 = \dot{x}_0 \delta z_0 - \dot{z}_0 \delta x_0 + x_0 \delta \dot{z}_0 - z_0 \delta \dot{x}_0.$$

The problem is solved to the first order in the approximation of small random spread of the initial values. To refine the mathematical expectation values of the orbital parameters, it is necessary to consider the quadratic terms in the

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expansions:

$$\Omega = \left[\operatorname{arctg}\left(-\frac{c_1}{c_2}\right)\right]_0 - \left(\frac{c_2}{c_1^2+c_2^2}\right)_0 \delta c_1 + \left(\frac{c_1}{c_1^2+c_2^2}\right)_0 \delta c_2;$$

$$i = \left(\operatorname{arctg}\frac{\sqrt{c_1^2+c_2^2}}{c_3}\right)_0 + \left(\frac{c_1 c_3}{c^3\sqrt{c_1^2+c_2^2}}\right)_0 \delta c_1 +$$

$$+ \left(\frac{c_2 c_3}{c^3\sqrt{c_1^2+c_2^2}}\right)_0 \delta c_2 - \left(\frac{\sqrt{c_1^2+c_2^2}}{c^2}\right)_0 \delta c_3;$$

$$p = \left(\frac{c^2}{k}\right)_0 + \left(\frac{2c}{k}\right)_0 \delta c; \qquad e = \left(\frac{f}{k}\right)_0 + \frac{1}{k}\delta f;$$

$$r_n = \left(\frac{c^2}{k+f}\right)_0 + \left(\frac{2c}{k+f}\right)_0 \delta c - \left[\frac{c^2}{(k+f)^2}\right]_0 \delta f;$$

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ACCESSION NR: AP5000111

$$r_0 = \left(\frac{c^2}{k-f}\right)_0 + \left(\frac{2c}{k-f}\right)_0 \delta c + \left(\frac{c^2}{(k-f)^2}\right)_0 \delta f;$$

$$a = \left(\frac{c^2 k}{k^2-f^2}\right)_0 + \left(\frac{2ck}{k^2-f^2}\right)_0 \delta c + \left[\frac{2c^2 fk}{(k^2-f^2)^2}\right]_0 \delta f;$$

$$b = \left(\frac{c^2}{\sqrt{k^2-f^2}}\right)_0 + \left(\frac{2c}{\sqrt{k^2-f^2}}\right)_0 \delta c + \left[\frac{c^2 f}{\sqrt{(k^2-f^2)^3}}\right]_0 \delta f;$$

$$i = \frac{\pi}{2}; \quad \Omega = \frac{\pi}{2}, \quad \frac{3\pi}{2}; \quad \omega = \left(\operatorname{arctg} \frac{f_3}{f_2}\right)_0 +$$

$$+ \left(\frac{f_3}{f_2^2+f_3^2}\right)_0 \delta f_2 - \left(\frac{f_2}{f_2^2+f_3^2}\right)_0 \delta f_3;$$

$$u_0 = \left(\operatorname{arctg} \frac{z_0 c}{c_1 y_0 - c_2 x_0}\right)_0 + \left[\frac{c\,(c_1 y_0 - c_2 x_0)}{W_0}\right]_0 \delta z_c + \left[\frac{z_0\,(c_1 y_0 - c_2 x_0)}{W_0}\right]_0 \delta c -$$

$$- \left(\frac{c y_0 z_0}{W_0}\right)_0 \delta c_1 - \left(\frac{c z_0 c_1}{W_0}\right)_0 \delta y_0 + \left(\frac{c z_0 c_2}{W_0}\right)_0 \delta x_0 + \left(\frac{c z_0 x_0}{W_0}\right)_0 \delta c_2,$$

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ACCESSION NR: AP5000111

$$W_0 = (c_2 y_0 - c_3 x_0)^2 + (z_0 c)^2;$$

where

$$T = \left[\frac{2\pi k c^3}{\sqrt{(k^2 - f^2)^3}}\right]_0 + \left[\frac{6\pi k c^2}{\sqrt{(k^2 - f^2)^3}}\right]_0 \delta c + \left[\frac{6\pi k c^3 f}{\sqrt{(k^2 - f^2)^3}}\right]_0 \delta f;$$

$$t_a = \left[t_0 + \tau_k - \frac{c^3}{\sqrt{(k^2 - f^2)^3}}(kE_k - f \sin E_k)\right]_0 - \left[\frac{3c^2(kE_k - f \sin E_k)}{\sqrt{(k^2 - f^2)^3}} + \right.$$

$$\left. + A\left(\frac{c}{\alpha\beta} - \frac{\gamma}{\beta^2}\frac{2z_0 f_2}{\alpha f_2}\right)\left(1 - \frac{f}{k}\cos E_k\right)\right]_0 \delta c - \left[L(-2k^2 B + \ldots kB - \sin E_k) + \right.$$

$$\left. + \frac{3c^2 f (kE_k - f \sin E_k)}{\sqrt{(k^2 - f^2)^5}}\right]_0 \delta f - \left(1 - \frac{f}{k}\cos E_k\right)_0 \left\{\left[A\left(\frac{c}{\alpha\beta} - \frac{\gamma}{\beta^2}\frac{2cf_2}{\alpha f_2}\right)\right]_0 \delta z_0 + \right.$$

$$+ \left[A\left(-\frac{z_0 c f_0}{\alpha^2\beta} + \frac{\gamma}{\beta^2}\frac{2z_0 c f_0 f_2}{\alpha^2 f_2}\right)\right]_0 \delta c_1 + \left[A\left(-\frac{z_0 c c_1}{\alpha^2\beta} + \frac{\gamma}{\beta^2}\frac{2z_0 c c_1 f_2}{\alpha^2 f_2}\right)\right]_0 \delta y_0 +$$

$$+ \left[A\left(-\frac{z_0 c c_2}{\alpha^2\beta} - \frac{\gamma}{\beta^2}\frac{2z_0 c c_2 f_2}{\alpha^2 f_2}\right)\right]_0 \delta x_0 + \left[A\left(\frac{z_0 c x_0}{\alpha^2\beta} - \frac{\gamma}{\beta^2}\frac{2z_0 c x_0 f_2}{\alpha^2 f_2}\right)\right]_0 \delta c_2 +$$

$$\left. + \left[A\left(-\frac{1}{f_2\beta} - \frac{\gamma}{\beta^2}\frac{2z_0 c}{\alpha f_2}\right)\right]_0 \delta f_2 + \left[A\left(\frac{f_2}{f_2^2\beta} - \frac{\gamma}{\beta^2}\frac{2z_0 c f_2}{\alpha f_2^2}\right)\right]_0 \delta f_2\right\} +$$

$$+ \left[\frac{6\pi k c^2}{\sqrt{(k^2 - f^2)^3}}\right]_0 \delta c + \left[\frac{6\pi k c^3 f}{\sqrt{(k^2 - f^2)^5}}\right]_0 \delta f,$$

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L 16354-65
ACCESSION NR: AP5000111

where $\tilde{E} = \sqrt{\frac{k-f}{k+f}}\,\mathrm{tg}\frac{u_0-\omega}{2}$; $B = \frac{\mathrm{tg}\frac{u_0-\omega}{2}}{(1+E^2)(k+f)\sqrt{k^2-f^2}}$.

$L = \frac{c^2}{\sqrt{(k^2-f^2)^3}}$; $A = \frac{2k\sqrt{\frac{k-f}{k+f}}}{1+E^2}L$;

$\alpha = c_1y_0 - c_2x_0$; $\beta = 2\left(1+\frac{z_0c}{c_1y_0-c_2x_0}\frac{f_3}{f_2}\right)$; $\gamma = \frac{z_0c}{\alpha} - \frac{f_3}{f_2}$.

In this instance, for the characteristics of the orbital parameter spread, it is sufficient to know the correlation matrix for the initial conditions with the random form of their distribution. Orig. art. has: 74 equations.

ASSOCIATION: Insty*tut mekhaniky* AN URSR (Institute of Mechanics, AN URSR)

SUBMITTED: 02Dec63 ENCL: 00

SUB CODE: AA, SV NO REF SOV: 002 OTHER: 000

Card 6/6

IGNATOV, Iv., inzh., st. nauchen sutrudnik

Fifteen years of the Scientific Research Institute of Communications. Radio i televiziia 13 no.11:322 '64.

1. Director, Scientific Research Institute of Communications.

L 13183-66 EWT(1)/EWP(m)/FS(v)-3/EWA(d) GW

ACC NR: AP6002338 SOURCE CODE: UR/0198/65/001/012/0082/0086

AUTHOR: Ignatov, I. V. (Kiev)

58

B

ORG: Institute of Mechanics, AN UkrSSR (Institut mekhaniki AN UkrSSR)

TITLE: Determining the probabilistic characteristics of parameters of perturbed motion of an artificial earth satellite

12,44

SOURCE: Prikladnaya mekhanika, v. 1, no. 12, 1965, 82-86

TOPIC TAGS: artificial earth satelite, orbit parameter, parameter probabilistic characteristic

ABSTRACT: The problem of approximate determination of the probabilistic characteristics (mathematical expectation and variance) of parameters of an osculating elliptical orbit is analyzed for an artificial satellite in a central gravitational field, taking the resistance of the atmosphere as the only perturbing force. Equations of motion of such a satellite in osculating elements are written from which approximate expressions for increments of parameters at an arbitrary revolution of the orbit are derived. (Actually only two parameters are considered: the semimajor axis a of the ellipse and the eccentricity e; increments for other parameters can be analogously determined in terms of the parameters.) Since a and e are random, their increments Δa and Δe are also random. The following relations for determining the parameters

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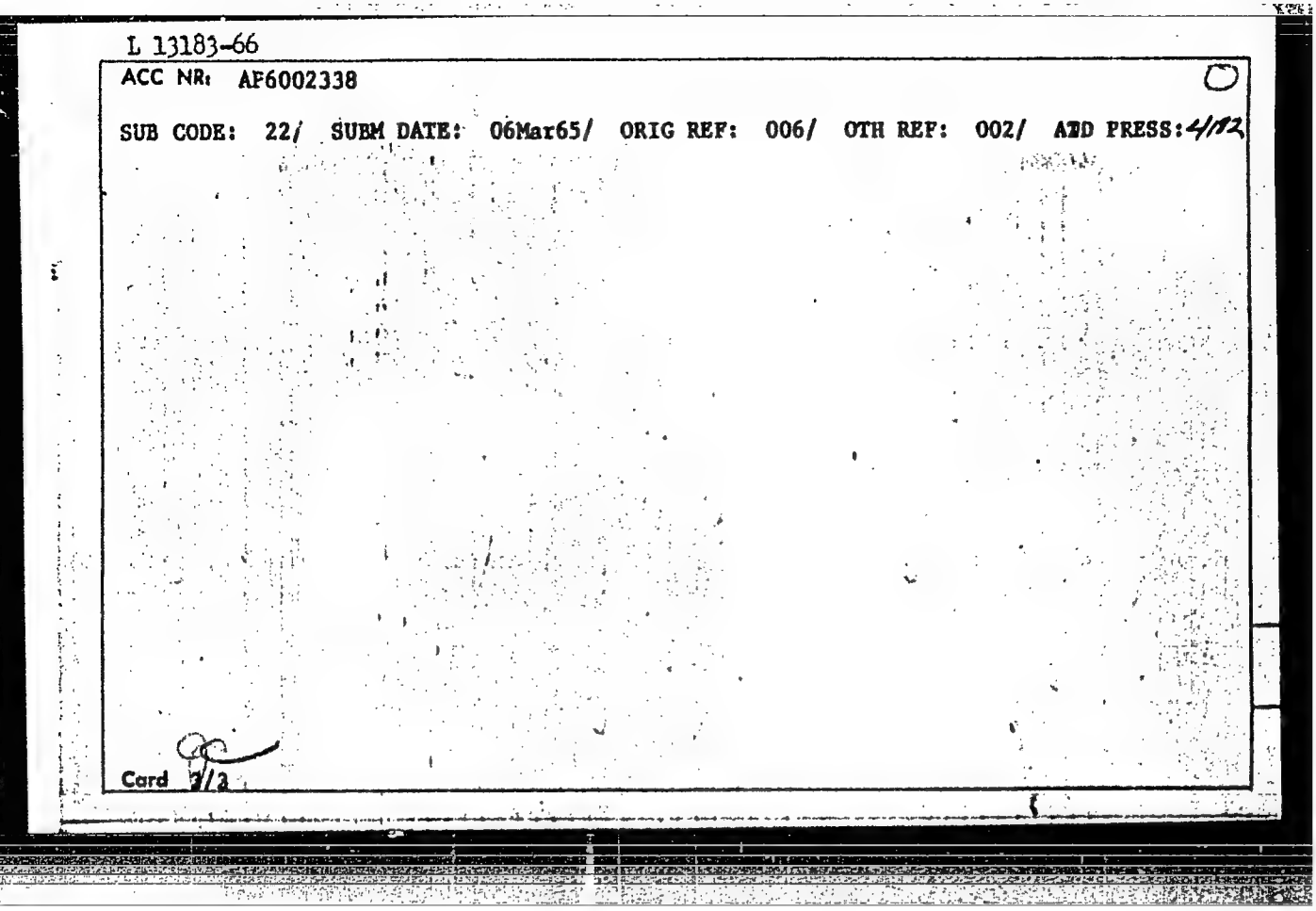
at the end of the first turn are:

$$a^{(1)} = a^{(0)} + \Delta a^{(1)}; \quad e^{(1)} = e^{(0)} + \Delta e^{(1)}, \tag{1}$$

where $a^{(0)}$, $e^{(0)}$ are the semimajor axis and the eccentricity of the initial orbit for which

$$a^{(0)} = a_0^{(0)} + \delta a; \quad e^{(0)} = e_0^{(0)} + \delta e, \tag{2}$$

where $a_0^{(0)}$, $e_0^{(0)}$ are rated values of the parameters and δa, δe are random components due to scattering of parameters at the end of the powered flight trajectory which can be determined by the method previously presented by the author (Prikladna mekhanika, v. 10, no. 6, 1964). It is noted that the exact mathematical expectation and the variance of $a^{(1)}$ and $e^{(1)}$ can be determined by means of the formulas presented by V. S. Pugachev (Theory of random functions. Fizmatgiz, 1960). However, these formulas contain the two-dimensional distribution function f(a, e) which is difficult and very often impossible to determine in practice. The author presents a method of determining the probabilistic characteristics of parameters by expanding expressions (1) in Taylor series in powers of δa and δe. By terminating the series at their quadratic terms approximate formulas are derived for determining the mathematical expectation and the variance of parameters for any turn of the orbit in terms of their rated (nominal) values and the random deviations of parameters from the initial orbit. Numerical results for certain particular orbits are presented. Orig. art. has: 8 formulas. [LK]



L 13183-66

ACC NR: AF6002338

SUB CODE: 22/ SUBM DATE: 06Mar65/ ORIG REF: 006/ OTH REF: 002/ ATD PRESS: 4/192

Card 3/3

IGNATOV, I.A., student.

Novarsenol in the treatment of pasteurellosis in swine. Veterinariia 32 no.11:93 N '55. (MIRA 8:12)

1.Omskiy veterinarnyy institut.
(NEOARSPHENAMINE) (SWINE PLAGUE)

IGNATOV, I.A., veterinarnyy vrach; SMIRNOV, G.Ye., veterinarnyy vrach.

Treatment of alimentary toxicosis in farm animals. Veterinariia 33 no.3:64 Mr '56. (MLRA 9:5)

1. Krasnozerskaya rayonnaya veterinarnaya lechebnitsa, Novosibirskoy oblasti.
(VETERINARY MEDICINE) (FOOD POISONING)

USSR/Diseases of Farm Animals. Diseases Caused by Bacteria and Fungi R

Abs Jour : Ref Zhur - Biol., No 19, 1958, No 88213

Author : Ignatov I.A.
Inst : Omsk Veterinary Institute
Title : Treating Leptospirosis in Calves with Tryptaflavine

Orig Pub : Sb. stud. nauchn. rabot. (Omskiy vet. in-t), 1957, vyp. 2, 42-45

Abstract : When a concentrated tryptaflavine solution (1 g/l dist. water) was used by being applied in a 0.08 ml. dose to the mucous membranes of eyes for 7-9 consecutive days once a day, 20 out of 21 calves which received such treatment recovered. Treating calves with neoarsphenamine, novarsenol, glucose, and diuretin did not produce any effects.

Card : 1/1

USSR / Zooparasitology. Parasitic Worms. G-7

Abs Jour : Ref Zhur - Biol., No 5, 1958, No 22459

Author : Artyukh, E. S., Gerkovi, B. L., Ignatov, I. D.
Inst : Not given
Title : Data on Helminthofauna of the Krasnodar Region. -- Materialy po gelmintofaune Krasnodarskogo kraya.

Orig Pub : Tr. Kubansk. s.-kh. in-ta, 1957, No. 3 (31), 227-229.

Abstract : In 1952-1953, in sheep of the Krasnodar region (based on complete helminthological dissection of 6 and a partial dissection of 52 bodies, and helminthocoprological investigation of 1422 sheep), 26 species of helminths were identified. Most numerous is the nematode group (widely disseminated are Dictyocaulus filaria, Haemonchus contortus). Cestodes frequently encountered are Moniezia expansa, larvae Echinococcus granulosus and Taenia hydatigena. In chickens (50 samples were dissected) a high extensive and intensive invasion by 5 species is noted.

Card 1/1

ANDRYUKHIN, V.S., inzhener; IGNATOV, I.F., inzhener; BRAYLOVSKIY, I.A.

Technique of hauling cars on the surface of coal mines. Mekh.trud. rab. 11 no.3:30-31 Mr '57. (MLRA 10:5)
(Coal handling machinery)

MARINOV, D.; IGNATOV, K.

On a technic for esophago-gastric anastomosis in resection of the esophagus and cardial portion of the stomach. Nauch. tr. vissh. med. inst. Sofia 9 no.4:181-205 '59.

1. Predstavena ot dots. R. Rainov, zav. Katedrata po operativna khirurgiia s topografska anatomiia.

(STOMACH surg) (ESOPHAGUS surg)

IGNATOV, K.

Cheap fertilizer. Sov. shakht. 13 no.3:4-5 Mr '64. (MIRA 17:3)

AUTHOR: Levin, E.M., Ignatov, K.V. and Matyushkin, M.A.

TITLE: The manufacture of built-up hobbing cutters (Izgotovleniye sbornykh chervyachnykh frez) 121-2-8/20

PERIODICAL: "Stanki i Instrument" (Machine Tools and Tools), 1957, No.2, pp. 28 - 29 (U.S.S.R.)

ABSTRACT: Some details of production based on the experience of the Minsk Tractor Plant (Minskiy Traktorniy Zavod) are reported. The hobbing cutter has longitudinal slots in which cutting racks are inserted locked in the slot by a wedge. The whole assembly is secured by ring nuts at each end. The body is made of chromium tool steel and heat treated to 30 Rockwell C hardness. The cutting racks are made of 18% tungsten high speed steel. The machining set-ups for cutting the slots and for sharpening the cutting racks in a stack are illustrated. The maching allowances are given. Two set-ups for milling the cutting racks are shown depending on the size. A machining set-up and details of wedge machining and the assembly fixture are illustrated.
There are 8 figures.

AVAILABLE:

1/1

IGNATOV, K.V., tekhn.; LEVIN, Ye.M., tekhn.; MATYUSHKIN, A.M.

Making sectional worm and thread-milling cutters. Mash.Bel. no.4:107-111 '57. (MIRA 11:9)
(Screw-cutting machines)

STOICHEV, K.; IGNATOV, L.; SAEV, S.

Spontaneous cure of mesenteric thrombosis. Khirurgiia, Sofia 8 no.1:66-69 1955.

1. Okruzhna bolnitsa - Kolarovgrad. Glaven lekar: St. Nikolov.
(THROMBOSIS, mesenteries, spontaneous cure)
(MESENTERIES, blood supply thrombosis, spontaneous cure)

PELEVIN, L.; NAYANZIN, I., inzh.; BATURIN, N.; RUY, Yu., tekhnolog (g.Khar'kov); TSIPERFIN, I.; KARLENKOV, B., aktivist; KAL'MANOVICH, M.; SERGIYENYA, K., normirovshchik; IGNATOV, L. (g.Tashkent)

From readers' letters. Izobr.i rats. no.6:38-40 Je '59. (MIRA 12:9)

1. Nachal'nik proizvodstvenno-tekhnicheskogo otdela neftepromyslovogo upravleniya "Tuymazyneft'", g.Oktyabr'skiy, BashASSR (for Pelevin). 2. Proizvodstvenno-tekhnicheskiy otdel neftepromyslovogo upravleniya "Tuymazyneft'", g.Oktyabr'skiy, BashASSR (for Nayanzin). 3. Starshiy inzhener tekhnicheskogo otdela parovozno-vagonnogo zavoda, g.Ulan-Ude (for Baturin). 4. Nachal'nik Byuro sodeystviya ratsionalizatsii i izobretatel'stvu Odesskogo zavoda zapasnykh chastey, g.Odessa (for TSiperfin). 5. Nachal'nik Byuro sodeystviya ratsionalizatsii i izobretatel'stvu Penzenskogo dizel'nogo zavoda, g.Penza (for Karlenkov). 6. Nikolayevskiy oblastnoy sovet Vsesoyuznogo obshchestva izobretateley i ratsionalizatorov, g.Nikolayev (for Kal'manovich). 7. Khar'kovskiy traktornyy zavod, g.Khar'kov (for Sergiyenya).

(Efficiency, Industrial)

LOMONOSOV, Yuriy Mikhaylovich; IGNATOV, Lev Aleksandrovich; AKBAROV, A., red.; MEL'NIKOV, A., tekhred.

[Manufacturing machine parts from capron] Izgotovlenie detalei mashin iz kaprona. Tashkent, Gos.izd-vo Uzbekskoi SSR, 1960. 25 p. (MIRA 14:2)

(Plastics--Molding)

IGNATOV, L.A., inzh.

Using magnetic plates for separating metals from molding sand.
Stroi. i dor.mashinostr. 4 no.2:26 F '59. (MIRA 12:2)
(Molding (Founding))

IGNATOV, L.A., inzh.

Shop for making soluble glass at the Tashkent Excavator Plant.
Stroi.i dor.mashinostr. 5 no.1:30-31 Ja '60. (MIRA 13:5)
(Tashkent--Soluble glass)

IGNATOV, L.A., inzh.; LOMONOSOV, Yu.M., inzh.

All-purpose adjustable dies. Stroi.i dor.mashinostr. 5 no.1: 33-36 Ja '60. (MIRA 13:5)
(Tashkent--Dies (Metalworking))

IGNATOV, L.A., inzh.; SUTIN, Ya.G., inzh.

Automatic welding at the Tashkent Excavator Plant. Stroi.i dor. mashinostr. 5 no.3:32-33 Mr '60. (MIRA 13:6)
(Tashkent--Excavating machinery)
(Electric welding)

IGNATOV, L.A.; inzh.; GLUSHCHENKO, V.G., inzh.

Sand for assembling caterpillar bands of excavators. Stroi. i dor. mashinostr. 5 no.4:28 Ap '60. (MIRA 13:9)
(Excavating machinery)

IGNATOV, L.A., inzh.

Plant mechanization office. Stroi. i dor. mashinostr. 5 no.10:34-36 O '60. (MIRA 13:10)
(Machinery--Technological innovations)

IGNATOV, L.A., inzh.

Servicing station for excavators at the end of the assembly line.
Stroi. i dor. mash. 6 no.10:33 O '61. (MIRA 14:10)
(Excavating machinery)

IGNATOV, L.A.

Mechanism of rotation and lid closing on cleaning drums.
Lit. proizv. no.12:30-31 D '61. (MIRA 14:12)
(Foundries—Equipment and supplies)
(Metal cleaning)

IGNATOV, Lev Aleksandrovich; MURAKAYEVA, A., red.; BABAKHANOV, A., tekhn. red.

[And how is everything with you?] A kak u vas? O ratsionalizatorskoi rabote na Tashkentskom ekskavatornom zavode. Tashkent, Gos.izd-vo UzSSR, 1962. 44 p. (MIRA 16:5)
(Tashkent--Excavating machinery)

ACCESSION NR: AR4027700 S/0276/64/000/002/B068/B068

SOURCE: RZh. Tekhnologiya mashinostroyeniya, Abs. 2B364

AUTHOR: Ignatov, L. N.

TITLE: Determination of the relation between total porosity and volumetric oi absorptivity for iron-graphite anti-friction parts

CITED SOURCE: Tr. Kuyby*shevsk. aviats. in-t, vy*p. 16, 1963, 267-271

TOPIC TAGS: total porosity, volumetric oil absorptivity, iron-graphite anti-friction part, anti-friction part, iron-graphite weaving part

TRANSLATION: The paper gives the regimes of impregnation of iron-graphite anti-friction parts with oil kept at 120 + 10C for one hour. The degree to which the pores are filled with oil is characterized by the ratio of the volumetric oil absorptivity to the total porosity of the part and averages 83--88%. Bibliography of 4 titles.

DATE ACQ: 24Mar64 SUB CODE: ML ENCL: 00

Card 1/1

L 57729-65 EWG(j)/EWP(e)/EPA(s)-2/EWT(m)/EPF(c)/EWP(1)/EWA(d)/EPR/EPA(w)-2/T/EWP(t)/EWP(k)/EWP(z)/EWP(b) Pf-4/Pr-4/Ps-4/Pt-7/Pab-10 MJW/JD/WW/JG/DJ/WH

ACCESSION NR: AR5015168 UR/0137/65/000/005/G038/G038

74
72
B

SOURCE: Ref. zh. Metallurgiya, Abs. 5G226

AUTHOR: Krysin, B. T.; Lebedeva, L. P.; Ignatov, L. N.; Kolpakov, Ya. V.

TITLE: New data on the technology of manufacturing articles of friction metalloceramic material, brand FMK-11 [Translator's note: Original gives FMK-P.]

CITED SOURCE: Tr. 7 Vses. nauchno-tekhn. konferentsii po poroshk. metallurgii. Yerevan, 1964, 257-265

TOPIC TAGS: metal ceramic material, friction metal ceramic, metal mechanical property, metal physical property, iron, powder metal, oxidized powder/FMK-11 friction metal ceramic

TRANSLATION: An investigation has been made of the effect of the starting materials and the technological conditions of pressing and sintering on the physical, mechanical, and friction properties of type FMK-11 metalloceramic friction material. The use of oxidized powders does not worsen the quality of the material. An increase in the oxygen content of the iron powder considerably reduces the wear of the material and the connected parts (ChNMKh cast iron).

Card 1/2

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ACCESSION NR: AR5015168 2

With an increase in pressing pressure, the wear of the material and the cast iron is lowered. The optimum pressing pressure is 6 tons/cm^2. Use of continuous sintering conditions permitted shortening the sintering time to 4.5-5 hrs and simplifying the technology of the process. Sintering was done under a pressure of 20-25 kg/cm^2. To avoid overbaking of disks, it is recommended to use antiscorching paint (22-24% black graphite, 14-16% quartz sand, 9-10% refractory clay, remainder water). The paint is applied to the packed disks before sintering without special preparation of the surface. V. Kvin.

SUB CODE: MM ENCL: 00

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Card 2/2

LEBEDEVA, L.P.; KRYSIN, B.T.; KOLPAKOV, Ya.V.; IGNATOV, L.N.;
MIKHAYLOVSKIY, V.A.; SMIRNOV, G.G.; TSYTSENKO, M.V.

Experimental production of iron-base friction ceramic metals.
Porosh. met. 5 no.8:96-102 Ag '65. (MIRA 18:9)

IGNATOV, Leonid Petrovich; STAROVOYTOV, Konstantin Semenovich; POTAPOV, Kh.Ye., red.; PONOMAREVA, A.A., tekhn. red.

[Some problems of agricultural planning] Nekotorye voprosy planirovaniia sel'skogo khoziaistva. Moskva, Izd-vo ekon. lit-ry, 1961. 207 p. (MIRA 15:4)
(Farm management)

IGNATOV, Lyuben (Bolgariya)

Current problems of health, living conditions and medical science. Sovet. med. 27 no.9:122-125 S'63 (MIRA 17:2)

IGNATOV, M.

Correct utilization of fresh water in ship boilers. p. 67.

TRANSPORTNO DELO. Vol. 8, no. 3, 1956

Sofiia, Bulgaria

SOURCE: East European Accessions List (EEAL) Library of Congress, Vol. 6, No. 1, January 1957

IGNATOV, Martin, inzh.

Apparatus for measuring and automatic control of temperature in the range from 0°C to 600° C. Elektroenergiia 12 no.10:17-20 '61.

1. NIIMM.

(Temperature)

ALEKSIEV, Al., inzh.; VRANCHEVA, S., inzh.; IGNATOV, M., inzh.

Development and study of the electric duplicate-milling device for the C11A lathe. Mashinostroene 12 no.4:30-33 Ap. '63.

ALEKSIEV, A., inzh.; LOZANOV, I., inzh.; IGNATOV, M., inzh.

A device for automatic disconnecting of machines in idle running. Elektroenergiia 14 no.7:17-20 Jl '63.

IGNATOV, M., inzh.

Nomogram for determining rated current and reactive power in transformers. Elektroenergiia 15 no.4:25-26 Ap '64.

IGNATOV, Martin, inzh.; LOZANOV, Iordan

Automatic controller of a power factor. Elektroenergiia 14 no.1:5-9 Ja '63.

IGNATUV, Mikaho D.

The most economical performance of a locomotive. Transp dele 6 no.3:29-33 '54.

1. Upravlenie Promishlenost po transporta.

IGNATOV, M. D.

Equalization of some parts in our locomotive boilers. p. 8.

Vol. 4, no. 1, Jan. 1955
TEKHNIKA
Sofiya, Bulgaria

So: Eastern European Accession Vol. 5 No. 4 April 1956

IGNATOV, Mircho D., inzh.

New electric locomotives for Bulgarian railroads. Tekhnika Bulg 12 no.4:27-29 '63.